

General Marking Instructions

Subject Details: Physics SL Paper 2 Markscheme

Mark Allocation

Candidates are required to answer ALL questions. Maximum total = [50 marks].

Markscheme format example:

Question		Answers	Notes	Total
4.	b ii	the displacement and acceleration ✓ are in opposite directions ✓	<i>Accept force for acceleration.</i>	2

- Each row in the “Question” column relates to the smallest subpart of the question.
- The maximum mark for each question subpart is indicated in the “Total” column.
- Each marking point in the “Answers” column is shown by means of a tick (✓) at the end of the marking point.
- A question subpart may have more marking points than the total allows. This will be indicated by “**max**” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
- An alternative wording is indicated in the “Answers” column by a slash (/). Either wording can be accepted.
- An alternative answer is indicated in the “Answers” column by “**OR**” on the line between the alternatives. Either answer can be accepted.
- Words in angled brackets < > in the “Answers” column are not necessary to gain the mark.
- Words that are underlined are essential for the mark.
- The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
- If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by ***OWTTE*** (or words to that effect) in the “Notes” column.
- Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

12. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. “ECF acceptable” will be displayed in the “Notes” column.
13. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.

Question		Answers	Notes	Total
1.	a	use of suitable kinematic equation eg: $-48 = 48 - 9.81t$ ✓ $9.8 \langle s \rangle$ ✓	<i>Award [2] for a bald correct answer.</i>	2
	b	$0 = 48^2 - 2a8$ so $a = 144 \langle m s^{-2} \rangle$ ✓ $F_{net} = 480 \times 144 \langle = 6.9 \times 10^4 \rangle$ ✓ average force $\langle = 6.9 \times 10^4 + 0.47 \times 10^4 \rangle = 7.4 \times 10^4 \langle N \rangle$ ✓		3
	c	reaction force is zero ✓ because object and container fall at same rate ✓		2
	d	volume $= 120 \times \pi \times (3.5)^2 = 4620 \langle m^3 \rangle$ ✓ $n = \frac{0.96 \times \text{volume}}{(8.31 \times 300)} = 1.78$ ✓ number of molecules $= 6.02 \times 10^{23} \times n = 1.1 \times 10^{24}$ ✓		3
	d	yes because pressure is low ✓ and temperature is high/moderate ✓		2
	e	stopping distance $\langle \text{in polystyrene} \rangle / 8 \text{ m}$ ✓	<i>Do not accept distance unqualified.</i>	1
	e	gradient decreases as time increases before hitting the polystyrene ✓ lower maximum ✓ graph must go on longer before deceleration ✓ same total area by eye ✓	<i>Accept a graph reaching terminal speed.</i>	3 max

Question		Answers	Notes	Total
2.	a	V proportional to I providing temperature/physical conditions are constant ✓		1
	b	<p>i</p> <p>use of $A = \langle \frac{\pi d^2}{4} \Rightarrow 7.1 \times 10^{-6} \text{ m}^2 \rangle$ ✓</p> <p>use of $R = \frac{\rho l}{A}$ ✓</p> <p>0.48 $\langle \Omega \rangle$ ✓</p>		3
	b	ii		1
	b	<p>iii</p> <p>electron collisions with lattice ions ✓</p> <p>loss of kinetic energy of electrons ✓</p> <p>increase of internal energy of lattice ions ✓</p>		3

Question		Answers	Notes	Total
3.	a	<p>travelling sound wave <is reflected at the barrier and> travels in opposite direction to original wave ✓</p> <p>mention of interference/superposition ✓</p> <p>minima caused by destructive interference ✓</p> <p>maxima caused by constructive interference ✓</p> <p>OR</p> <p>travelling sound wave <reflects at the barrier and> travels in opposite direction to original wave ✓</p> <p>reflected wave superposes with original wave ✓</p> <p>forming a standing wave ✓</p> <p>maxima are positions of antinodes, minima are positions of nodes ✓</p> <p>recognition that 3.5 wavelengths are covered ✓</p>		4
	b	<p>i</p> <p>0.29 <m> ✓</p>		
	b	<p>measure each position of several minima/maxima using a ruler ✓</p> <p>use data to determine mean wavelength ✓</p> <p>measure frequency of waves using eg: oscilloscope/frequency meter/electronic guitar tuner ✓</p> <p>use of $c = f\lambda$ ✓</p>	<p>Accept look up wave frequency or read from apparatus.</p>	3 max